

AOS 100/101
Spring 2017

HOMEWORK #5
(Due Fri. April 7)

Please provide concise, grammatically correct, neatly written answers to the following questions. All questions can be answered in, at most, a few sentences. Don't forget to write your name on the paper!!!

NAME:

- 1) Two saturated parcels of air, A and B, are lifted 1 km. Parcel A has a specific humidity of 10 g kg^{-1} . Parcel B has a specific humidity of 20 g kg^{-1} . Which parcel experiences the *lesser* rate of cooling upon being lifted? Explain your answer.
(10 pts)
- 2) This question will involve consideration of conditions observed on two different days. On Day One, the surface temperature is 25°C and the surface dewpoint is 15°C . On Day Two, the surface temperature is 25°C and the surface dewpoint temperature is 20°C . If cumulus clouds form on both days, on which of the two days is the *cloudbase* (i.e. the height of the bottom of the cloud) lower? Clearly explain the reasoning you used to arrive at your answer.
(10 pts)
- 3) Imagine a parcel of air is forced to ascend from the surface to 8 km above the surface by the approach of a weather system. Explain how it is possible for that parcel to cool first at the dry adiabatic rate, then at the moist adiabatic rate, and then again at the dry adiabatic rate during its ascent.
(10 pts)
- 4) On a certain day the lapse rate over Madison is measured to be $7^\circ\text{C}/\text{km}$. If saturated surface air has a temperature of 15°C , will it be able to rise further on its own upon being lifted to a height of 1 km (i.e. will it be *positively buoyant* at 1 km)? Clearly explain the reasoning you used to arrive at your answer.
(10 pts)